

observers of the Weather Bureau on the middle Atlantic and New England coasts generally attended the advance or passage of general storms.

#### OCEAN ICE IN JULY.

The limits of the region within which icebergs or field ice were reported for July, 1893, are shown on Chart I by ruled shading.

The southernmost ice reported, an iceberg on the 1st in the position given, was about 2° south of the average southern limit of ice for July, and, with the exception of ice noted in July, 1890, was the southernmost ice noted for July during the last 11 years. The easternmost ice reported, pieces of ice in the position given in the table, was about 1½° east of the average eastern limit of ice for July. The ice reported was well distributed over the Grand Banks, off the eastern coast of Newfoundland, and in and east of the Straits of Belle Isle.

The following table shows the southern and eastern limits

of the region within which icebergs or field ice were reported for July during the last 11 years:

| Southern limit. |         |          | Eastern limit.   |         |          |
|-----------------|---------|----------|------------------|---------|----------|
| Month.          | Lat. N. | Long. W. | Month.           | Lat. N. | Long. W. |
| July, 1883..... | 42 42   | 49 57    | July, 1883.....  | 46 47   | 45 44    |
| July, 1884..... | 46 24   | 50 02    | July, 1884.....  | 48 36   | 46 28    |
| July, 1885..... | 42 14   | 48 30    | July, 1885.....  | 48 00   | 44 00    |
| July, 1886..... | 42 59   | 49 15    | July, 1886*..... | 45 52   | 34 30    |
| July, 1887..... | 43 30   | 50 05    | July, 1887.....  | 52 04   | 41 16    |
| July, 1888..... | 46 30   | 54 00    | July, 1888.....  | 47 40   | 50 10    |
| July, 1889..... | 44 49   | 47 45    | July, 1889.....  | 45 50   | 40 00    |
| July, 1890..... | 41 25   | 47 30    | July, 1890†..... | 50 08   | 38 45    |
| July, 1891..... | 43 16   | 49 45    | July, 1891.....  | 47 02   | 48 00    |
| July, 1892..... | 43 04   | 50 17    | July, 1892.....  | 48 00   | 44 40    |
| July, 1893..... | 41 40   | 50 08    | July, 1893.....  | 46 10   | 42 20    |
| Mean.....       | 43 33   | 49 29    | Mean.....        | 47 50   | 43 51    |

\* An iceberg and field ice.

† On the 10th a small piece of ice was reported in N. 48° 33', W. 24° 11'.

#### TEMPERATURE OF THE AIR (expressed in-degrees Fahrenheit).

The distribution of mean temperature over the United States and Canada for July, 1893, is exhibited on Chart II by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the temperature is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Weather Bureau represents the mean of the maximum and minimum temperatures.

The mean temperature was highest in the lower Colorado and Gila valleys, where it ranged from 90 to 95, and at points in the Colorado Desert, California, the mean readings were above 100. The mean temperature was above 85 over a large part of the interior of Texas, and was above 80 in the south Atlantic and Gulf states, along the Mississippi River as far north as Saint Louis, Mo., in the Southwestern States, and in the central valleys of California. The mean temperature was lowest in the lower Saint Lawrence valley, in western Nova Scotia and Alberta, in the mountains of Colorado, and along the immediate middle and north Pacific coasts, where it was 60, or below, and the mean readings were below 70 generally over New England and New York, the northern Lake region, northern Minnesota, northern North Dakota, and southward over the Rocky Mountain region to south-central New Mexico.

#### DEPARTURES FROM NORMAL TEMPERATURE.

The mean temperature was generally below the normal over the middle Atlantic and western New England states, and from the Pacific coast over the greater part of the plateau region. The mean values were slightly below the normal over the Florida Peninsula, and from the lower Missouri valley to the west Gulf coast. From the Lake region to the east Gulf and south Atlantic coasts, in the Canadian Maritime Provinces and Maine, from the northeast slope of the Rocky Mountains over the Saskatchewan and middle Missouri valleys, and on the southeast and middle-eastern slopes of the Rocky Mountains the month was somewhat warmer than usual. The most marked departure below the normal temperature was noted in the valley of the Columbia River and at San Francisco, Cal., where the mean readings were 3 below the normal. The greatest departure above the normal temperature, 3 to 4, was

reported in Manitoba. At Havre, Mont., in the middle Ohio valley, eastern Tennessee, and at Dubuque, Iowa, the departure above the normal was 2 to 3.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for July for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for July, 1893; (4) the departure of the current month from the normal; (5) and the extreme monthly mean for July during the period of observation and the years of occurrence:

| State and station.       | (1) Normal for the month of July. | (2) Length of record. | (3) Mean for July, 1893. | (4) Departure from normal. | (5) Extreme monthly mean for July. |       |         |            |
|--------------------------|-----------------------------------|-----------------------|--------------------------|----------------------------|------------------------------------|-------|---------|------------|
|                          |                                   |                       |                          |                            | Highest.                           | Year. | Lowest. | Year.      |
| <i>Arizona.</i>          | °                                 | Years                 | °                        | °                          | °                                  |       | °       |            |
| Fort Apache.....         | 75.7                              | 21                    | 73.4                     | - 2.3                      | 83.6                               | 1877  | 70.3    | 1883       |
| Fort Mohave.....         | 95.4                              | 22                    | .....                    | .....                      | 100.1                              | 1873  | 90.1    | 1888       |
| Whipple Barracks.....    | 75.2                              | 22                    | 70.5                     | - 4.7                      | 81.7                               | 1878  | 70.4    | 1883, 1891 |
| <i>Arkansas.</i>         |                                   |                       |                          |                            |                                    |       |         |            |
| Keesees Ferry.....       | 81.2                              | 11                    | 78.6                     | - 2.6                      | 84.2                               | 1888  | 75.2    | 1882       |
| <i>California.</i>       |                                   |                       |                          |                            |                                    |       |         |            |
| Fort Bidwell.....        | 71.4                              | 22                    | 67.2                     | - 4.2                      | 75.9                               | 1874  | 63.9    | 1884       |
| Riverside.....           | 76.9                              | 11                    | .....                    | .....                      | 79.4                               | 1883  | 73.1    | 1892       |
| <i>Colorado.</i>         |                                   |                       |                          |                            |                                    |       |         |            |
| Las Animas.....          | 75.7                              | 10                    | 75.0                     | - 0.7                      | 79.1                               | 1890  | 73.0    | 1891       |
| <i>Florida.</i>          |                                   |                       |                          |                            |                                    |       |         |            |
| Merritts Island.....     | 80.8                              | 11                    | 83.2                     | + 2.4                      | 83.2                               | 1893  | 73.5    | 1886       |
| <i>Georgia.</i>          |                                   |                       |                          |                            |                                    |       |         |            |
| Forsyth.....             | 81.8                              | 19                    | 82.8                     | + 1.0                      | 85.7                               | 1881  | 78.3    | 1882       |
| <i>Idaho.</i>            |                                   |                       |                          |                            |                                    |       |         |            |
| Boise Barracks.....      | 73.8                              | 19                    | 70.9                     | - 2.9                      | 79.6                               | 1873  | 69.4    | 1884       |
| Fort Sherman.....        | 67.1                              | 9                     | 64.9                     | - 2.2                      | 74.2                               | 1889  | 62.6    | 1884       |
| <i>Indiana.</i>          |                                   |                       |                          |                            |                                    |       |         |            |
| Lafayette.....           | 73.4                              | 11                    | 77.7                     | + 4.3                      | 79.8                               | 1887  | 69.0    | 1882       |
| <i>Indian Territory.</i> |                                   |                       |                          |                            |                                    |       |         |            |
| Fort Supply.....         | 80.5                              | 14                    | 82.2                     | + 1.7                      | 85.8                               | 1874  | 76.4    | 1891       |
| <i>Iowa.</i>             |                                   |                       |                          |                            |                                    |       |         |            |
| Cresco.....              | 70.8                              | 20                    | 71.1                     | + 0.3                      | 75.2                               | 1874  | 65.1    | 1891       |
| <i>Kansas.</i>           |                                   |                       |                          |                            |                                    |       |         |            |
| Eureka Ranch.....        | 80.9                              | 10                    | 78.8                     | - 2.1                      | 86.2                               | 1890  | 76.3    | 1891       |
| Independence.....        | 79.5                              | 21                    | 79.3                     | - 0.2                      | 85.9                               | 1879  | 74.7    | 1891       |
| Salina.....              | 81.1                              | 10                    | .....                    | .....                      | 86.3                               | 1890  | 76.2    | 1891       |
| <i>Louisiana.</i>        |                                   |                       |                          |                            |                                    |       |         |            |
| Grand Coteau.....        | 82.1                              | 8                     | 82.0                     | - 0.1                      | 85.4                               | 1884  | 79.0    | 1892       |
| <i>Maine.</i>            |                                   |                       |                          |                            |                                    |       |         |            |
| Orono.....               | 67.0                              | 23                    | .....                    | .....                      | 71.0                               | 1887  | 64.2    | 1884       |
| <i>Maryland.</i>         |                                   |                       |                          |                            |                                    |       |         |            |
| Cumberland.....          | 72.1                              | 22                    | 75.2                     | + 3.1                      | 77.7                               | 1889  | 70.3    | 1888       |
| <i>Michigan.</i>         |                                   |                       |                          |                            |                                    |       |         |            |
| Kalamazoo.....           | 72.2                              | 16                    | 73.8                     | + 1.6                      | 77.8                               | 1885  | 67.2    | 1891       |
| <i>Missouri.</i>         |                                   |                       |                          |                            |                                    |       |         |            |
| Sedalia.....             | 78.4                              | 13                    | 79.0                     | + 0.6                      | 82.8                               | 1888  | 71.2    | 1891       |
| <i>Montana.</i>          |                                   |                       |                          |                            |                                    |       |         |            |
| Fort Custer.....         | 70.7                              | 11                    | 73.5                     | + 2.8                      | 74.2                               | 1890  | 67.8    | 1884       |
| <i>Nebraska.</i>         |                                   |                       |                          |                            |                                    |       |         |            |
| Fort Robinson.....       | 72.7                              | 10                    | 71.8                     | - 0.9                      | 78.1                               | 1886  | 66.9    | 1891       |
| Genoa (near).....        | 74.7                              | 17                    | 75.4                     | + 0.7                      | 78.6                               | 1890  | 69.8    | 1891       |
| <i>Nevada.</i>           |                                   |                       |                          |                            |                                    |       |         |            |
| Browns.....              | 83.5                              | 21                    | .....                    | .....                      | 89.1                               | 1873  | 79.4    | 1881       |
| Carson City.....         | 71.3                              | 15                    | 65.5                     | - 5.8                      | 73.7                               | 1875  | 65.5    | 1893       |

## Departures from normal temperature—Continued.

| State and station.        | (1) Normal for the month of July. | (2) Length of record. | (3) Mean for July, 1893. | (4) Departure from normal. | (5) Extreme monthly mean for July. |            |         |       |
|---------------------------|-----------------------------------|-----------------------|--------------------------|----------------------------|------------------------------------|------------|---------|-------|
|                           |                                   |                       |                          |                            | Highest.                           | Year.      | Lowest. | Year. |
| <i>New Hampshire.</i>     | °                                 | Years                 | °                        | °                          | °                                  |            | °       |       |
| Hanover .....             | 69.2                              | 21                    | 66.3                     | - 2.9                      | 72.1                               | 1878       | 66.3    | 1893  |
| <i>New Mexico.</i>        |                                   |                       |                          |                            |                                    |            |         |       |
| Fort Wingate .....        | 73.2                              | 22                    | .....                    | .....                      | 77.8                               | 1873       | 68.1    | 1888  |
| <i>New York.</i>          |                                   |                       |                          |                            |                                    |            |         |       |
| Cooperstown .....         | 68.2                              | 22                    | 65.4                     | - 2.8                      | 73.0                               | 1887       | 64.5    | 1884  |
| Plattsburg Barracks ..... | 69.6                              | 21                    | 67.8                     | - 1.8                      | 73.2                               | 1887       | 65.2    | 1891  |
| <i>North Carolina.</i>    |                                   |                       |                          |                            |                                    |            |         |       |
| Lenoir .....              | 74.4                              | 20                    | 75.7                     | + 1.3                      | 77.7                               | 1877       | 66.4    | 1884  |
| <i>Oklahoma.</i>          |                                   |                       |                          |                            |                                    |            |         |       |
| Fort Reno .....           | 80.7                              | 10                    | 81.0                     | + 0.3                      | 84.9                               | 1887       | 76.2    | 1891  |
| Fort Sill .....           | 82.2                              | 22                    | 85.0                     | + 2.8                      | 86.0                               | 1871       | 77.2    | 1880  |
| <i>Oregon.</i>            |                                   |                       |                          |                            |                                    |            |         |       |
| Bandon .....              | 57.6                              | 9                     | 58.0                     | + 0.4                      | 59.5                               | 1888       | 54.6    | 1887  |
| <i>Pennsylvania.</i>      |                                   |                       |                          |                            |                                    |            |         |       |
| Dyberry .....             | 67.8                              | 20                    | 65.6                     | - 2.2                      | 72.6                               | 1887       | 63.0    | 1891  |
| Grampian .....            | 70.5                              | 22                    | 70.4                     | - 0.1                      | 76.8                               | 1887       | 65.4    | 1891  |
| Wellsboro .....           | 69.0                              | 14                    | .....                    | .....                      | 76.1                               | 1881       | 60.4    | 1891  |
| <i>South Carolina.</i>    |                                   |                       |                          |                            |                                    |            |         |       |
| Statesburg .....          | 78.1                              | 12                    | 80.2                     | + 2.1                      | 84.0                               | 1881       | 74.6    | 1891  |
| <i>South Dakota.</i>      |                                   |                       |                          |                            |                                    |            |         |       |
| Fort Sully .....          | 74.8                              | 22                    | 77.2                     | + 2.4                      | 80.2                               | 1871       | 70.9    | 1884  |
| <i>Texas.</i>             |                                   |                       |                          |                            |                                    |            |         |       |
| Austin .....              | 84.0                              | 20                    | 85.0                     | + 1.0                      | 88.3                               | 1879, 1884 | 82.0    | 1877  |
| Silver Falls .....        | 80.3                              | 7                     | 82.4                     | + 2.1                      | 83.9                               | 1888       | 74.6    | 1887  |
| <i>Utah.</i>              |                                   |                       |                          |                            |                                    |            |         |       |
| Terrace .....             | 82.1                              | 18                    | .....                    | .....                      | 89.3                               | 1874       | 77.6    | 1875  |
| <i>Vermont.</i>           |                                   |                       |                          |                            |                                    |            |         |       |
| Stratford .....           | 69.2                              | 20                    | 65.2                     | - 4.0                      | 73.5                               | 1887       | 65.2    | 1893  |
| <i>Virginia.</i>          |                                   |                       |                          |                            |                                    |            |         |       |
| Dale Enterprise .....     | 75.8                              | 13                    | 73.6                     | - 2.2                      | 83.0                               | 1887       | 71.5    | 1884  |
| <i>Washington.</i>        |                                   |                       |                          |                            |                                    |            |         |       |
| Fort Townsend .....       | 61.4                              | 19                    | 58.3                     | - 3.1                      | 66.1                               | 1875       | 58.3    | 1893  |
| <i>West Virginia.</i>     |                                   |                       |                          |                            |                                    |            |         |       |
| Parkersburg .....         | 77.6                              | 12                    | .....                    | .....                      | 87.0                               | 1881       | 68.9    | 1886  |
| <i>Wisconsin.</i>         |                                   |                       |                          |                            |                                    |            |         |       |
| Embarrass .....           | 71.0                              | 22                    | .....                    | .....                      | 74.7                               | 1874       | 65.5    | 1891  |
| Madison .....             | 72.1                              | 22                    | 73.0                     | + 0.9                      | 75.2                               | 1885       | 66.6    | 1891  |
| <i>Wyoming.</i>           |                                   |                       |                          |                            |                                    |            |         |       |
| Fort Washakie .....       | 69.4                              | 8                     | 67.6                     | - 1.8                      | 73.7                               | 1886       | 65.4    | 1891  |

## TEMPERATURE, JANUARY TO JULY, 1893.

For the period January 1 to July 31, 1893, the temperature averaged about normal in the Gulf States and over the southern plateau region. Over the northern plateau region and on the north Pacific coast the temperature averaged 3 to 4 below, and in the middle Atlantic and New England states, the upper Mississippi and Missouri valleys, on the northeast and middle-eastern slopes of the Rocky Mountains, over the middle plateau region, along the middle Pacific and south Atlantic coasts, in the Lake region, and the Ohio Valley and Tennessee, it averaged 1 to 2 below the normal. On the southeast slope of the Rocky Mountains and in the extreme northwest the mean temperature was 1 to 2 above the normal for the period named.

## YEARS OF HIGHEST MEAN TEMPERATURE FOR JULY.

At Raleigh, N. C., Columbia, S. C., Merritts Island, Fla., Palestine and Abilene, Tex., and Lexington Ky., the mean temperature for the current month was the highest on record for July during the respective periods of observation. The highest mean temperature for July was noted on the south Pacific coast and in the Sacramento Valley in 1891; in the middle Mississippi and Ohio valleys and the lower lake region in 1887, and in the upper lake region in 1878.

## YEARS OF LOWEST MEAN TEMPERATURE FOR JULY.

At Hanover, N. H., Stratford, Vt., Carson City, Nev., Keeler,

Cal., and Fort Townsend, Wash., the mean temperature for the current month was the lowest on record for July during the respective periods of observation. The lowest mean temperature for July was noted generally in the central valleys, the Lake region, and Atlantic coast states north of the 35th parallel in 1892; and in the upper Missouri valley in 1884.

## MAXIMUM TEMPERATURE.

The highest temperature reported by a regular station of the Weather Bureau was 109 at Yuma, Ariz., on the 10th. The maximum temperature ranged from 105 to 107 in eastern Montana, and reached 107 at Miles City on the 21st, and ranged from 103 to 108 in the central valleys of California. The maximum values were above 100 over the interior of North Carolina and South Carolina, on the Georgia and northern Florida coasts, from the northeast slope of the Rocky Mountains over South Dakota, in Kansas, and from northeastern Texas and northwestern Louisiana over the southern part of the country to southeastern California. The maximum readings were also above 100 in southeastern Washington and northeastern Oregon. At Volcano Springs, in the Colorado Desert, Cal., a maximum reading of 122 was reported. The maximum temperature was below 70 along the immediate Pacific coast north of San Francisco, Cal., and was below 80 along the entire immediate Pacific coast. At Nantucket, Mass., the maximum for the month was 80.

## MINIMUM TEMPERATURE.

At Tampa, Fla., Walla Walla, Wash., and San Francisco, Cal., the minimum temperature was the lowest noted for July during the respective periods of observation.

The lowest temperature noted at regular stations of the Weather Bureau for July, 1893, 37, was registered at Havre, Mont., on the 2d, and at Baker City, Oregon, on the 7th. The minimum temperature was below 50 in northern New England, the northern lake region, the Red River of the North Valley, over the middle and northern Rocky Mountain and plateau regions, and along the immediate Pacific coast north of Los Angeles, Cal. The highest minimum temperature, 73, was noted at Key West, Fla. The lowest temperature reached at Yuma, Ariz., was 70.

## RANGES OF TEMPERATURE.

The greatest daily ranges of temperature are shown in the table of miscellaneous meteorological data. The greatest monthly ranges of temperature occurred in northeast Montana and Idaho, where they exceeded 60. From the northern Rocky Mountain region the monthly ranges decreased eastward to less than 30 on the south New England coast, southeastward to 20 over extreme southern Florida and to 30 on the middle and west Gulf coasts, and westward to less than 30 on the middle Pacific, and to less than 20 on the north Pacific coasts.

## FROST.

Light frost was reported in the interior of Maine on the 10th and 12th; in New Hampshire on the 22d; in western New York on the 24th and 28th; in northeast Indiana and southwest Lower Michigan on the 4th; in the northern Rocky Mountain region on the 7th, 12th, 14th, 23d, 24th, and 28th; in central Oregon on the 5th and 12th; at Happy Valley, Oregon, on the 7th and 8th; and at Vernonia, Oregon, on the 6th, 19th, 20th, and 28th.

## PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for July, 1893, as determined from reports of more than 2,000 stations, is exhibited on Chart III. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for reg-

ular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the